CONSIDERATIONS AND INITIAL RISK EVALUATION							CONTROL INPUT AND RESIDUAL RISK EVALUATION				Action Program	
	Risk Event	Cause & Impact		Assessment of Risk without controls in place			Control Input	Assessment of Risk with controls in place				
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PMLU 1	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Landform Failure**	1. Erosional instability 2. Geotechnical instability 3. Inadequate or inappropriate geotechnical assessment 4. Ineffective placement of spoil material 5. Differential settlement - ineffective and or inappropriate placement of spoil material (including backfilled dams) 6. Insufficient materials to achieve design (rock, growth media) 7. Unsuitable spoil used on final landform surface 8. Flooding 9. Not achieving design 10. Inappropriate modelling and design 11. Selection of inappropriate PMLU 12. Fire	- Failure of vegetation (vegetated cover) - Failure of water management / drainage - Failure of growth media - Erosion resulting in gully erosion - Slumping and settlement - Mass movement of landform - Inability to meet surface water quality criteria (due to exposure of problematic underlying materials) - Ecosystem impacts - Fire destroys revegetated areas and compromises landform stability	Almost Certain	Minor	M	Preventative Controls: - Landform design appropriate for PMLU, designed by an AQP, and implemented in accordance with PRCP Schedule requirements. - All major earthworks (including reshaping, pushing, trimming etc) undertaken in accordance with the design specifications provided by an Appropriately Qualified Person (AQP). - Ongoing materials characterisation - Closure landform design, growth media and spoil assessment by AQP to determine ameliorant and fertiliser requirements. - Review the topsoil and rock material balance periodically during operations to ensure sufficient volumes for the rehabilitation needs - Selective handling of materials for placement - No contour banks on slopes - Landform surrounding the spoil dumps and voids to be reshaped to be free-draining where required to prevent impacts - Groundcover including vegetation to provide erosion resistance - Construction governance (work packs) - Bushfire management plan to prevent / mitigate fire risk - Flood modelling to validate velocity of < 2.5 m/s against rehab for the 0.1% AEP Mitigating Controls: - Monitoring of landform stability and rehabilitation success to be undertaken post-rehabilitation - Identify requirements for rectification works - Complete maintenance - Verified rehabilitation performance that already demonstrates criteria achievement (over time)	Minor	Possible	L	Yes	PRC Plan Section 3.7.1.3
PMLU 2	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Altered hydrogeological conditions (to modelled/assumed conditions), based on interaction of groundwater with spoil dumps. (For all areas, excluding TSFs (PMLU11 & 12))**	1. Release of contaminants to groundwater (percolation through spoil, or toe seepage interacting with shallow aquifer) 2. Change in groundwater flow, recharge and/or discharge characteristics resulting in changes to the hydrogeological system 3. Hydrogeologic conditions that are different to groundwater modelling outcomes	- Groundwater chemistry altered rendering it not suitable for extraction and/or to support PMLU - Groundwater quality not supporting the establishment/maintenance of Environmental Values and Water Quality Objectives for the basins in which the site is located - AMD reporting to shallow and deep groundwater systems - Reduction of groundwater height within surrounding extraction bores - Degradation of terrestrial and aquatic groundwater dependant ecosystems (GDEs)	Possible	Medium	M	Preventative Controls: - Residual void catchments to be designed and created to establish sinks that provide for the collection of seepage from former operational areas and spoil dumps (maintenance of the void as a sink in perpetuity) - Groundwater modelling to validate particle tracking from spoils to voids - Regular, ongoing monitoring (re-assessing and calibration of groundwater model, resulting in refined design, as needed) (accounting for climate predictability) - Pre-defined backfill planning aligned to site-wide source-sink retention - Mine-affected water dams to be decommissioned (including investigation for potential contamination and groundwater impacts). - Groundwater monitoring to be undertaken in accordance with EA conditions - Appropriate management, placement, and monitoring of waste (spoil, tailings, rejects) during operations - Landforms constructed to minimise the potential for flooding of the residual voids - Groundwater condition assessment integrated into mine planning constraints Mitigating Controls: - Assessment and remediation of impacted material, where appropriate - Re-establishment of impacted ecosystems - Decommissioning of impacted supply bores and re-instatement in suitable location	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3
PMLU 3	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Alteration of surface water systems**	1. Release of contaminants to surface water resources 2. Changes to alignments and ecosystems of drainage lines and creek 3. Changes to hydraulic flows 4. Changes to flood patterns/distribution (including climate change) 5. Alteration of surface water infiltration rates 6. Surface water flows over unvegetated/disturbed soils where revegetation has not re-established 7. Overland discharges from neighbouring landforms and rehabilitated areas 8. Creeks and drainage lines not attaining successful rehabilitated state	- Surface water chemistry altered rendering it not suitable for PMLU - AMD reporting to surface water - Degradation of ecosystems and land uses connected to surface water flows and floodplains on and down gradient of the mine - Sedimentation of downstream surface water drainage lines resulting in changes to their hydraulic properties and impacting ecosystems - Surface water quality not supporting the establishment/maintenance of Environmental Values and Water Quality Objectives for the basins in which the mine is located - Accelerated erosion rates from surface water flows in disturbed areas and degraded ecosystems - Reduction in rehabilitation success rates due to reduced surface water quality - Alteration of soil properties associated with contaminants carried by surface waters, including erodibility and geotechnical qualities	Likely	Medium	H	Preventative Controls: - All imported hazardous materials to be stored and used in accordance with relevant standards and removed from site on completion of operations - Appropriate management, placement, and monitoring of waste (spoil, rejects) during operations - Mine affected water dams and industrial sites to be decommissioned and areas rehabilitated - Surface water monitoring to be undertaken in accordance with EA conditions - Monitoring of surrounding ecosystems will be undertaken in accordance with EA conditions - Rehabilitation of disturbed areas will be undertaken as soon as possible after land becomes available - Rehabilitation and monitoring of disturbed reaches of creeks undertaken - Appropriate management, placement, and monitoring of waste (spoil, tailings, rejects) during operations - Landforms and creek diversions designed and constructed (AQP) to minimise the potential for flooding of the residual voids - Erosion and sediment control systems installed per detailed rehabilitation design specifications Mitigating Controls: - Surface water monitoring data to be collected in accordance with the EA. If impacts are identified, further investigations will be undertaken to determine appropriate remedial measures - Any loss of hazardous contaminants that cause contaminated land/environmental harm will be reported and investigated/remediated as appropriate - Remedial works will be undertaken where releases from site result in impacts to surface waters, which may include alteration of the landforms, implementation of additional controls/measures that reduce the potential for surface water impacts and/or re-establishment of impacted ecosystems where appropriate - Rehabilitated landforms and creek diversions/watercourses that do not attain a stable state to be repaired and revegetated - Ongoing geochemical testing to continue to verify potential contaminants reporting to surface water	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3

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PMLU 4	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Creek diversions not achieving closure objectives**	1. Inadequate or inappropriate diversion design 2. Hydrologic characteristics of surface water and groundwater systems not representative of natural reaches 3. Hydraulic characteristics not representative of natural reaches 4. Geomorphic instability (bank erosion) 5. Seepage to/from residual voids or spoil dumps impacting on stability 6. Sediment transport regime is not in equilibrium with and/or representative of the natural reaches 7. Poor riparian vegetation diversity and cover 8. High percentage of weeds/ invasive species 9. Poor water quality from runoff from surrounding landforms and rehabilitated areas 10. Failure of landforms impacting the performance of the diversion 11. Failure of rehabilitation along creek diversion	- Sediment regime impacts within diversion and downstream reaches resulting in changes to hydraulic properties - Surface water chemistry altered rendering it not suitable for PMLU - Degradation of downstream ecosystems and land uses connected to surface water flows and floodplains - Surface water quality not supporting the establishment/maintenance of Environmental Values and Water Quality Objectives for the basins in which the mine is located - accelerated rates of erosion and instability within diversion embankments and surrounding the diversion causing landform instability, damage to rehabilitation areas and alteration of diversion hydraulics - changes to environmental flows and flood regimes impacting on surrounding land users and environmental receptors - Rehabilitation failure along length of creek diversion - Unstable diversion channel erodes into adjacent void	Almost Certain	Medium	H	Preventative Controls: - Functional design and as constructed plans prepared by an AQP as per the guideline: *"Works that interfere with water in a watercourse for a resource activity—watercourse diversions authorised under the Water Act 2000 (OSW/2019/4599) (DNRME 2019)", or the latest revision of that guideline* - Creek diversion monitoring to relevant IDC standard and maintenance implemented during the operational phase - Disturbed natural watercourse bed and banks are rehabilitated and returned to a stable profile - Growth media and spoil assessment by AQP to determine ameliorant and fertiliser requirements - Revegetation species aligned to growth media, landforms and PMLU - Surface water drainage infrastructure that interacts with the creek diversions during operations will be removed prior to closure (e.g. watercourse crossing and culverts) - Rehabilitation of surrounding landforms. Mitigating Controls: - Rehab undertaken during dry season - Surface water monitoring data to be collected. If impacts are identified, further investigations will be undertaken to determine appropriate remedial measures - Rehabilitated landforms that do not attain a stable state to be investigated, repaired, revegetated and/or redesigned	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3
PMLU 5	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Contaminated land impacting on environmental receptors, rehabilitation and attainment of PMLUs**	1. Discharges and accumulation of hazardous contaminants (including emerging contaminants) from operational activities. 2. Deterioration of retained built infrastructure in mining industrial areas, from lack of maintenance	- Contaminants present within soil or water that present an unacceptable risk to the receiving environment or PMLU - Alteration of soil chemistry that impacts on structural characteristics - Contaminants reducing the soil suitability for rehabilitation species - Degradation of terrestrial and aquatic groundwater dependant ecosystems (GDEs) - Contamination of surface water runoff affecting integrity of local catchments	Likely	Major	H	Preventative Controls: - Contaminated land assessments as required to identify and verify sources - Hazardous substance assessment and approval process - Environmental Authority conditions and Australian Standards govern hazardous substance use, storage and management requirements - Cleaning up of spills upon identification - Remediation or management of residual contamination - Ongoing surface water and groundwater monitoring providing an earlier indication of contamination - Management of operational activities to limit any potential contamination - All imported hazardous materials to be stored and used in accordance with relevant standards and removed from site on completion of operations - Infrastructure inspections and ongoing maintenance of plant, measures and equipment Mitigating Controls: - Investigate and remediate contamination incidents - At the completion of operations all stored hazardous materials and infrastructure within the MIA and CHPP, that have the potential to release contaminants to environmental receptors, will be either remediated in-situ, disposed of on-site as authorised under the Environmental Authority, or removed and disposed of at an approved landfill, with waste tracking information recorded and submitted. - Contaminated Land Investigation completed in accordance with the Environmental Protection Act 1994, including a site investigation report, and where required, a Validation Report and/or a draft Site Management Plan. - Removal of primary or secondary sources - Restrict site usage - Undertake ongoing monitoring to manage contaminated land risks	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3
PMLU 6	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Flooding influences on rehabilitation and final landforms**	1. Water inundation of landforms 2. Saturation of materials within landforms 3. Velocities of floodwaters on rehabilitated landforms 4. Inaccurate modelling	- Reduction in geotechnical stability of landforms causing failure of the landforms - Failure of the landform into the creek, altering its geomorphology - Activation of dispersive materials resulting in accelerated erosion and sedimentation - Mobilisation of any contaminants contained within the landforms and impacts to downstream water and groundwater quality - Alteration of terrestrial ecology through introduction of weeds, sedimentation, or damage to rehabilitation species not able to withstand flooding - Erosion of landforms due to increased velocities of flood waters - Fire destroys revegetated areas and compromises landform stability	Almost Certain	Medium	H	Preventative Controls: - Flood modelling for 0.1% Annual Exceedance Probability (AEP) informing landform design - Establishment of landforms that are stable and provide appropriate level of flood protection to the residual voids (0.1% AEP flood event) - Removal of surface water drainage infrastructure from watercourses (crossings and culverts), decommissioning of dams and remediation of contaminated material where required - Design of landforms within flood extents that are stable and able to withstand flooding and water velocities - Establishment of vegetation suitable for the environment and reduces erosion risks - Energy dissipation measures (e.g. rock lining) installed in areas where high-energy flows (≥2.5m/s) are determined by an AQP Mitigating Controls: - Assessment of landform failure and required rectification works upon safe access to site immediately after the flood event. Assessment to include identification of measures that would limit potential for ongoing impacts. - Re-engineering of landforms to mitigate future failures followed by re-construction of landforms, and rehabilitation works. - Assessment of downstream impacts and undertake remediation/rehabilitation as required to re-establish drainage line hydraulics and ecosystems in liaison with the administering authority. - Monitoring of landform stability and rehabilitation success to be undertaken	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3

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PMLU 7	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Rehabilitated landforms result in alteration of flood hydrology upstream and downstream.**	1. Changes to drainage network hydraulics. 2. Artificial landforms reducing or increasing flood extent and changing velocities/flows. 3. Changes to vegetation cover and soil type which alter runoff and infiltration rates. 4. Environmental flows impacted due to incorrect runoff coefficients	- Increasing/decreasing of flood extents, frequency and severity - Degradation of ecosystems due to altered flows, flood extent, duration or frequency - Infrastructure damage - Health and safety risks to on-site and off-site land users associated with increased flood heights, velocities and frequency	Almost Certain	Major	C	Preventative Controls: - Removal of surface water drainage infrastructure that would adversely interfere with stream hydraulics (crossings and culverts) and decommissioning of dams - Establishment of landforms that are stable and provide appropriate level of flood protection to the residual voids (0.1% AEP flood event (extremely conservative) - Undertake monitoring and maintenance works where required to maintain landforms - Landform design with consideration of water balance and catchment size - Reduction of catchment with landform and rehabilitation - Flood modelling for 0.1% AEP informing landform design - Energy dissipation measures (e.g. rock lining) installed in areas where high-energy flows (≥2.5m/s) are determined by an AQP - Ongoing environmental monitoring in accordance with the PRCP Schedule. Mitigating Controls: Due to the off-site nature of the impacts, which occur during significant flood events, available mitigating controls at the time of the impact are limited due to safety and accessibility restrictions. After flooding has receded, landform design and alteration could be undertaken to reduce possible future events.	Major	Rare	M	Yes	PRC Plan Section 3.7.1.3
PMLU 8	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of: **Insufficient or inappropriate growth media and rock resources required for rehabilitation activities.**	1. Insufficient growth media and rock quantities of suitable quality 2. Unstable material (erosive, dispersive, saline materials) 3. Weed infestation (soil is already infested with weed seeds) 4. Insufficient placement depth and surface treatment 5. Incorrect soil and rock characterisation and amelioration 6. Inappropriate topsoil and rock stockpiling and management	- Erosion - Growth media loss - Topsoil deficit - Failure of vegetative groundcover (poor vegetation growth or incorrect vegetation affecting PMLU)	Almost Certain	Catastrophic	C	Preventative Controls: - Growth media surveys and mapping (growth media management system) - Review the growth media and rock resource quantities periodically during operations to ensure sufficient volumes for the rehabilitation needs (material balance for mine and rehab planning) - Implement rehabilitation execution including amelioration to address requirements for growth media, rock, seed and management for the PMLU (work packs) - Management of topsoil and rock stockpiles and application during rehabilitation. - Execution governance (compliance to plan work packs) Mitigating Controls: - Monitoring of landform stability and rehabilitation success to be undertaken post rehabilitation to confirm stability and identify requirements for rectification works. - Repair erosion areas, retest growth media and revegetate.	Major	Possible	H	Yes	PRC Plan Section 3.7.1.3
PMLU 9	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as a result of **Inadequate and/or inappropriate management of mineral waste in general spoil landforms.**	1. Inadequate or incorrect geochemical characterisation and assessment of landform materials. 2. Management strategy adopted was inadequate or inappropriate to manage the AMD hazards of the waste materials. 3. Incorrect or inappropriate mine planning processes to account for management (spatial and temporal) for adverse materials in landform. 4. Poor final landform execution (e.g. poor/incorrect landform reshaping, resulting in exposure of adverse material)	- Contamination of surface water and/or groundwater by AMD or other contaminants. - Impact to flora (vegetation failure) - Impact to fauna (aquatic)	Possible	Medium	M	Preventative Controls: - Material characterisation through exploration drilling and ongoing geochemical testing - Mine planning strategy for life of mine mineral waste management (placement and cover requirements) - Mine planning haulage model (including material categorisation) for life of mine mineral waste management - Material placement tracking system (Corvus) - Monitoring of growth media and spoil to be undertaken post rehabilitation to confirm stability and identify requirements for rectification works - Rehabilitation maintenance and/or corrective actions - NUMAs are acting as sinks for groundwater - Spoil materials have buffering capacity (high neutralising ANC) - Post-capping QA/QC Mitigating Controls: - Material characterisation (outcomes to be stored into GeoBank) in line with Whitehaven Materials Standards - Remove and / or cover undesirable materials - Appropriate material placement and selective handling during operations - Management of operational activities to limit any potential contamination - Appropriate water quality monitoring for surface and groundwater to enable tracking of processes affecting water quality during operation and into closure - Undertaking appropriate fate and transport modelling during operations - Ongoing geochemical testing to continue to verify low likelihood of AMD or other contaminants reporting to surface water	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3
PMLU 10	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as result of: **Inadequate and/or inappropriate revegetation**.	1. Unfavourable climatic conditions and/or weather events 2. Incorrect species mix 3. Poor seed quality 4. Weed contaminated seed 5. Poor quality growth media or seed bed preparation 6. Erosion 7. Land contaminants 8. Incorrect agronomy and amelioration advice 9. Poor planning and execution	- Exposed soils due to poor vegetation establishment and growth, resulting in enhanced erosion rates. - Increased weed establishment and growth. - Reduction in land capability of PMLU (woodland habitat and/or grazing) - Need for ongoing corrective action - Additional soil sampling and analysis, amelioration and re-vegetation.	Almost Certain	Major	C	Preventative Controls: - Landform design - Growth media and spoil assessment by AQP to determine ameliorant and fertiliser requirements - Revegetation species selection aligned to growth media, landforms and PMLU - Management of seed selection, provenance and quality control implemented as per PRCP Schedule requirements. - Plant at optimal time of year. - Post execution governance (compliance to plan work packs) Mitigating Controls: - Monitoring of landform stability and rehabilitation success to be undertaken post operations to confirm stability and identify requirements for rectification works. - Repair erosion areas, retest materials, review seed mix and revegetate.	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3

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PMLU 11	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as result of: **Failure of TSF and rejects rehabilitation (landform and function).**	1. Inadequate or incorrect geochemical characterisation and assessment of landform materials. 2. Management strategy adopted was inadequate or inappropriate to manage the AMD hazards of the waste materials. 3. Incorrect or inappropriate mine planning processes to account for management (spatial and temporal) for adverse materials in landform. 4. Poor final landform execution (e.g. poor/incorrect landform reshaping, resulting in exposure of adverse material) 5. Geotechnical instability including foundation failure and slope failure 6. Erosional instability including surface water quality to receiving environment not meeting target criteria, failure of vegetative cover and ineffective erosion protection elements	- Financial cost of rectification and remediation - Reputational damage - Loss of containment - Contamination of surface and groundwater sources - Failure of achievement of PMLU - Contamination of surface and groundwater sources	Likely	Catastrophic	C	Preventative Controls: - Material characterisation to understand short-term and long-term geochemical behaviour - Mine planning strategy for life of mine mineral waste management (placement and cover requirements) - Mine planning haulage model (including material categorisation) for life of mine mineral waste management - Material placement tracking system (Corvus) - TSF and reject cover systems designed by an AQP to be erosional stable, geotechnically stable, supportive of the PMLU and effective in mitigating the potential for migration of contaminants to the receiving environment. - Ongoing periodic monitoring by appropriately qualified persons to ensure alignment with rehabilitation milestones and PMLU requirements - Remediation works where evidence through ongoing monitoring suggests that PMLU requirements may not be achieved - Surface and groundwater monitoring - In situ geochemical monitoring - TSF closure management plan Mitigating Controls: - Material characterisation (outcomes to be stored into GeoBank) in line with Whitehaven Materials Standards - Remove and / or cover undesirable materials - Response (maintenance, remediation, increased monitoring, notification to any affected stakeholders) to performance indicators not being met. - Appropriate material placement and selective handling during operations - Management of operational activities to limit any potential contamination - Appropriate water quality monitoring for surface and groundwater to enable tracking of processes affecting water quality during operation and into closure - Undertaking appropriate fate and transport modelling during operations - Ongoing geochemical testing to continue to verify low likelihood of AMD or other contaminants reporting to surface water	Major	Rare	M	Yes	PRC Plan Section 3.7.1.3
PMLU 12	Stable condition (safe, stable, non-polluting and sustainable) for land described as a PMLU (cattle grazing, woodland habitat, watercourse) is not achieved as result of: **Failure of TSF and rejects cover system resulting in ongoing seepage (NCPP, Laleham and Bottom Dam TSFs; R36 rejects)**	1. Inadequate or incorrect geochemical characterisation and assessment of landform materials. 2. Management strategy adopted was inadequate or inappropriate to manage the AMD hazards of the waste materials. 3. Incorrect or inappropriate mine planning processes to account for management (spatial and temporal) for adverse materials in landform. Inadequate cover placement 4. Inappropriate cover material 5. Inadequate cover design 6. Cover doesn't function as designed 7. Cover deterioration over time	- AMD seepage impact on surrounding water values (surface and groundwater)	Almost Certain	Medium	H	Preventative Controls: - Material characterisation to understand short-term and long-term geochemical behaviour - Mine planning strategy for life of mine mineral waste management (placement and cover requirements) - Mine planning haulage model (including material categorisation) for life of mine mineral waste management - Material placement tracking system (Corvus) - TSF and reject cover systems designed by an AQP to be erosional stable, geotechnically stable, supportive of the PMLU and effective in mitigating the potential for migration of contaminants to the receiving environment. - NUMAs are acting as sinks for groundwater - Cover design based on trials - Material characterisation - Water balance and groundwater modelling to validate the TSF is a sink - Out of pit TSFs and out of pit reject dumps report to groundwater sink - Monitoring of the cover after significant rainfall during operation of the mine Mitigating Controls: - Groundwater monitoring with TARP - Surface water monitoring with TARP - Material characterisation (outcomes to be stored into GeoBank) in line with Whitehaven Materials Standards - Remove and / or cover undesirable materials - Appropriate material placement and selective handling during operations	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3
NUMA 1	NUMA does not achieve safe, structurally stable condition or causes environmental harm as a result of: **Void walls not achieving geotechnical stability**	1. Increase/decrease in predicted void water levels 2. Use of inaccurate geological model (geotechnical parameters) 3. Poor low-wall and high-wall design (compliance to plan) 4. Erosional instability 5. Non-conformance to design 6. Inappropriate modelling and design	- Failure of void walls leads to instability beyond NUMA extent -Failure of landform protecting final void from flooding	Almost Certain	Major	C	Preventative Controls: - Geotechnical assessment to be completed by AQP taking into consideration failure zones and proximities to public infrastructure and mining lease boundaries, and floodwaters against creek-side batters (where relevant) - Pit wall designs based on geotechnical assessments and flood modelling (as required) - Pit walls are constructed per AQP designs, using non-dispersive materials - Pit floor treatments as required during operations to improve low-wall stability. - Geotechnical monitoring during operations. - Updated geotechnical assessment to be completed as mining approaches final limits and wall design and NUMA extent adjusted if required. - NUMA extents designed to include the required factor of safety (FoS) limit. - Bunding, fencing and signage placed at FoS limit. - Water balance and groundwater modelling to validate the pit lake is below the zone of weathering Mitigating Controls: - Geotechnical monitoring - Identify requirements for rectification works.	Major	Unlikely	H	Yes	PRC Plan Section 3.7.1.3
NUMA 2	NUMA does not achieve safe, structurally stable condition or causes environmental harm as a result of: **Uncontrolled access to NUMA areas**	1. Inappropriate design, management and construction of safety bund 2. Inadequate/poorly maintained fencing and signage	- Unmanaged access to NUMA by people or livestock	Likely	Major	H	Preventative Controls: - Safety bund, fencing and signage placed at FoS limit, where required. Mitigating Controls: - Compliance checks as part of monitoring	Major	Rare	M	Yes	PRC Plan Section 3.7.1.3

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NUMA 3	NUMA does not achieve safe, structurally stable condition or causes environmental harm as a result of: **Uncontrolled flooding into residual voids**	1. Flood mitigation (backfill and/or landforms) is not constructed or installed correctly, or included as part of future mine planning 2. Inaccurate flood modelling 3. Erosion/piping failure of flood protection landform	- Uncontrolled capture of flood waters - Altered/changed alignment of creeks and drainage lines - Removal of downstream environmental flows - Filling of residual void with water and interconnecting groundwater units - Geotechnical instability of residual void - Contamination of clean surface water flows, within residual void - Contamination of groundwater resources	Almost Certain	Major	C	Preventative Controls: - Flood modelling completed by an AQP, confirms the landform design prevents the inundation of floodwaters into the residual void, up to and including the 0.1% AEP event - Pit wall designs are based off geotechnical assessments which considers floodwaters against creek-side batter/s (where relevant) - Landform is thick enough to prevent seepage from flood water though the landform, based on duration of wetting the landform by 0.1% AEP - Flood mitigation designed to correct flood event and outside of the predicted failure slope assessed with a suitable factor of safety - Energy dissipation measures (e.g. rock lining) installed in areas where high-energy flows (≥2.5m/s) are determined by an AQP for the 0.1% AEP - Regular, ongoing monitoring (re-assessing and calibration of groundwater model, resulting in refined design, as needed, accounting for climate change) - Flood mitigation (partial backfill and/or landforms) Mitigating Controls: - Compliance checks as part of monitoring - Review flood modelling following flood events to refine model	Medium	Rare	L	Yes	PRC Plan Section 3.7.1.3
NUMA 4	NUMA does not achieve safe, structurally stable condition or causes environmental harm as a result of: **Water in the void causes environmental harm outside of the mining tenure (due to pit lake)**	1. Groundwater outflow seepage not identified by groundwater modelling 2. Poor water quality 3. Overtopping or interconnection of the void lake with shallow groundwater water units 4. Groundwater significantly above model forecast/predications 5. Contributing catchment to the void is larger due to changes to landform or failure to divert clean water catchments	- Pit lake level elevated, turning it into a source - Reduction in surface and/or groundwater quality down gradient of the site - Degradation of ecosystems interacting with impacted water - Changes to the chemistry of shallow groundwater units - Groundwater extraction/use off site impacted	Likely	Major	H	Controls: - Maximum area of each NUMA is limited to the extents defined in the approved PRCP Schedule - Clean water diversions included in landform design - Ongoing groundwater modelling to validate predicted flows - Ongoing water balance modelling to validate predicted lake levels - Water quality modelling completed by AQP - Catchment area minimised where possible and practical to do so - Flood mitigation (partial backfill and/or landforms) designed to provide protection for a 0.1% AEP event - Groundwater quality and level monitoring - Water quality monitoring - Containment of potential sediment as a result of erosion from the low-wall within the residual void - TSF cover systems designed by an AQP to be erosionally stable, geotechnically stable and effective in mitigating the potential for migration of contaminants to the receiving environment. Mitigating Controls: - Rectification works on impacted ecosystems or bores - Installation of engineering controls to limit potential for ongoing impacts	Medium	Unlikely	M	Yes	PRC Plan Section 3.7.1.3